**REMARKS**

Claims 1-26 and 31-33 are pending. Claims 27-30 have been canceled pursuant to their withdrawal from consideration, without disclaimer, and subject to Applicant's right to file a divisional application with claims directed to the withdrawn subject matter. Claims 1, 10, 14, and 20 are in independent form.

As a threshold matter, Applicant respectfully disagrees with the characterization of Applicant's technology presented in the Remarks found on page 2 of the Office action mailed March 28, 2007. Instead, Applicant respectfully directs the Examiner's attention to the specific language of the claims.

**Rejections under 35 U.S.C. § 102**

Claims 1 and 14 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,200,710 to Hada (hereinafter "Hada").[1]

Claim 1 relates to a method that includes identifying a pair of features to be printed using a corresponding pair of patterning elements, the pitch of the pair of features being sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation

[1] In light of the relationship between claims 1 and 14, Applicant has assumed that claim 14, rather than claim 4, stands rejected under 35 U.S.C. § 102(b) as anticipated by Hada. If this assumption is in error, Applicant respectfully requests that the present response be considered *bona fide* and an extended period for response be given.

between the corresponding pair of patterning elements, and increasing a separation distance between the pair of patterning elements while maintaining the sufficiently small pitch between the corresponding printed features.

Claim 14 relates to an article that includes a machine-readable medium storing instructions operable to cause one or more machines to perform operations. The operations include the activities recited in claim 1.

As anticipation rejections, the rejections of claims 1 and 14 are understood to contend that Hada describes the recited subject matter "in as complete detail as is contained in the ... claim[s]." *See, e.g., M.P.E.P.* § 2131 (*citing Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, (Fed. Cir. 1989)).

Applicant respectfully disagrees. In this regard, Hada primarily deals with *charged beam microlithography reticles*. *See, e.g., Hada*, col. 1, line 6-11. Perhaps unsurprisingly in light of the limited impact of diffraction effects in charged beam lithography, Hada does not address diffraction effects in charged beam microlithography at all.

As best understood, the rejection contends that Hada's "distortion correction" inherently addresses diffraction effects. For example, Hada describes that

> Two types of predistortion processing are of especial utility. The first is distortion correction, in which the LSI design data (in the divided condition effected by step S105) are manipulated to produce feature distortions that are opposite to corresponding distortions of the respective features exhibited by the projection-optical system. Whenever a reticle is made using reticle data created in this way and an exposure transfer is performed using such a reticle, the distortion of the projection optical system and the distortion of the features on the reticle cancel each other out and the pattern projected onto the substrate surface is free of distortion." *Id.*, col. 6, line 47-58.

Applicant respectfully submits that this discussion of distortion by an projection optical system refers to Hada's "complementary reticles." In particular, certain features (such as doughnut features) require two separate exposures using two different reticles. These reticles are complementary in that the same pattern portion is exposed twice, i.e., once with each reticle. *Id.*, col. 2, line 33-45.

Hada makes it clear that one of the two complementary reticles can be an optical lithography reticle. *Id.*, col. 4, line 1-3. Hada's predistortion processing thus anticipates the

distortion from an optical-system and alters a characteristic of the *complementary* charged beam microlithography reticle to cancel the optical-system distortion. *Id.*, col. 4, line 1-3; col. 6, line 47-58.

Since Hada leaves an optical lithography reticle unchanged, it is clear that Hada neither describes nor suggests increasing a separation distance between a pair of patterning elements that are to print a pair of features with a pitch that is sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the pair of patterning elements, as recited in claims 1 and 14.

Accordingly, anticipation has not been established. Applicant respectfully requests that the rejections of claims 1 and 14 be withdrawn.

Claim 10 was rejected under 35 U.S.C. § 102(b) as anticipated by Hada.

Claim 10 relates to a method that includes identifying a pair of features to be printed using a corresponding pair of patterning elements, the pitch of the pair of features being sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation

between the corresponding pair of patterning elements, and increasing a dimension of at least one of the pair of patterning elements in a direction perpendicular to the sufficiently small pitch.

Applicant respectfully traverses the rejection. As discussed above, Hada primarily deals with charged beam microlithography reticles and Hada does not address diffraction effects in charged beam microlithography at all.

As for Hada's predistortion processing, it anticipates the distortion from an optical-system and alters a characteristic of a complementary charged beam microlithography reticle to cancel the optical-system distortion. Hada thus leaves an optical lithography reticle unchanged and neither describes nor suggests increasing a dimension of at least one of a pair of patterning elements that are to print a pair of features with a pitch that is sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the pair of patterning elements, as recited in claim 10.

Accordingly, anticipation has not been established. Applicant respectfully requests that the rejection of claim 10 be withdrawn.

Claim 20 was rejected under 35 U.S.C. § 102(b) as anticipated by Hada.

Claim 20 relates to an apparatus that includes a mask operative to image features using electromagnetic radiation having a wavelength, the mask including an adjacent pair of patterning elements having one or more distorted dimensions to accommodate for diffraction effects due to a size of the patterning elements and a spacing between the patterning elements approaching a diffraction limit of said radiation, wherein the dimensions of the patterning elements are distorted relative to dimensions of the imaged features.

Applicant respectfully traverses the rejection. As discussed above, Hada primarily deals with charged beam microlithography reticles and Hada does not address diffraction effects in charged beam microlithography at all.

As for Hada's predistortion processing, it anticipates the distortion from an optical-system and alters a characteristic of a complementary charged beam microlithography reticle to cancel the optical-system distortion. Hada thus leaves an optical lithography reticle unchanged and neither describes nor suggests a mask that includes an adjacent pair of patterning elements having one or more distorted dimensions to accommodate for diffraction effects, as recited in claim 20.

Accordingly, anticipation has not been established. Applicant respectfully requests that the rejection of claim 20 be withdrawn.

**Rejections under 35 U.S.C. § 103**

Claims 1 and 14 were rejected under 35 U.S.C. § 103(a) as obvious over Hada and U.S. Patent No. 6,792,591 to Shi et al. (hereinafter "Shi").

As obviousness rejections, the rejections contend that the subject matter recited in claims 1 and 14 would have been obvious to one of ordinary skill in light of Hada and Shi.

Applicant respectfully disagrees. To begin with, Hada primarily deals with charged beam microlithography reticles, while Shi deals with optical photolithography reticles. *See, e.g., Shi*, col. 1, line 18-21. In thus appears that Hada and Shi are not in the same field of endeavor and Applicant submits that it would not be obvious for one of ordinary skill to attempt to combine them.

Moreover, the rejection has never set forth any basis speculating how Hada and Shi are to be combined to arrive at the claimed subject matter. As discussed above, Hada leaves optical lithography reticles unchanged and instead chooses to alter characteristics of complementary charged beam microlithography reticles. There is no description or suggestion in either reference or the Office action as to how Hada is to be combined with Shi's mitigation of optical proximity effects, and no reason for this combination would be apparent based on common sense.

Moreover, Shi's mitigation of optical proximity effects neither describes nor suggests increasing a separation distance between a pair of patterning elements that are to print a pair of features with a pitch that is sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the pair of patterning elements, as recited in claims 1 and 14.

In this regard, Shi describes that "forbidden pitch" regions are to be identified and eliminated. *Id.*, col. 4, line 45-48. According to Shi, "forbidden pitches" are pitch ranges within which the field phase produced by a neighboring feature is substantially 180 degrees out of phase relative to the field phase of a main feature, thereby resulting in destructive interference. *Id.*, col. 7, line 4-14. Such destructive interference reduces the image contrast of the main feature, and as a result, causes a loss of exposure latitude. *Id.*

Shi describes two different approaches to eliminating forbidden pitch regions. In the first approach, designers can select illumination angles that avoid the extreme interaction pitch areas which result in destructive interference. *Id.*, col. 13, line 1-6. Such a selection of illumination angles leaves an optical lithography reticle unchanged and hence neither describes nor suggests increasing a separation distance between a pair of patterning elements that are to print a pair of

features with a pitch that is sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the pair of patterning elements, as recited in claims 1 and 14.

In Shi's second approach to eliminating forbidden pitch regions, Shi describes that scattering bars can be placed around main features. *Id.*, col. 13, line 52 - col. 14, line 15. However, scattering bars are typically non-resolvable by the exposure tool. *Id.*, col. 4, line 22-27. Hence, the placement of scattering bars also fails to describe or suggest increasing a separation distance between a pair of patterning elements that are to print a pair of features with a pitch that is sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the pair of patterning elements, as recited in claims 1 and 14.

Accordingly, claims 1 and 14 are not obvious over Hada and Shi. Applicant respectfully requests that the rejections of claims 1, 14, and the claims dependent therefrom be withdrawn.

Claim 10 was rejected under 35 U.S.C. § 103(a) as over Hada and Shi.

Applicant respectfully traverses the rejection. As discussed above, Hada primarily deals with charged beam microlithography reticles, while Shi deals with optical photolithography reticles. In thus appears that Hada and Shi are not in the same field of endeavor and it would not be obvious for one of ordinary skill to attempt to combine them.

Moreover, the rejection has never set forth any basis speculating as to how Hada and Shi are to be combined to arrive at the claimed subject matter. As discussed above, Hada leaves optical lithography reticles unchanged and instead chooses to alter characteristics of complementary charged beam microlithography reticles. There is no description or suggestion in either reference or the Office action as to how Hada is to be combined with Shi's mitigation of optical proximity effects.

Moreover, Shi's mitigation of optical proximity effects neither describes nor suggests increasing a dimension of at least one of a pair of patterning elements that are to print a pair of features with a pitch that is sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the pair of patterning elements, as recited in claim 10.

In this regard, Shi describes two different approaches to eliminating forbidden pitch regions. In the first approach, designers can select illumination angles that avoid the extreme interaction pitch areas which result in destructive interference. Such a selection of illumination angles leaves an optical lithography reticle unchanged. In Shi's second approach, "typically non-resolvable" scattering bars are placed around main features. Such a placement of scattering bars also fails to describe or suggest increasing a dimension of at least one of a pair of patterning elements, as recited in claim 10.

Accordingly, claim 10 is not obvious over Hada and Shi. Applicant respectfully requests that the rejections of claim 10 and the claims dependent therefrom be withdrawn.

Claim 20 was rejected under 35 U.S.C. § 103(a) as over Hada and Shi.

Applicant respectfully traverses the rejection. As discussed above, Hada primarily deals with charged beam microlithography reticles, while Shi deals with optical photolithography reticles. In thus appears that Hada and Shi are not in the same field of endeavor and it would not be obvious for one of ordinary skill to attempt to combine them.

Moreover, the rejection has never set forth any basis speculating as to how Hada and Shi are to be combined to arrive at the claimed subject matter. As discussed above, Hada leaves optical lithography reticles unchanged and instead chooses to alter characteristics of complementary charged beam microlithography reticles. There is no description or suggestion in either reference or the Office action as to how Hada is to be combined with Shi's mitigation of optical proximity effects.

Moreover, Shi's mitigation of optical proximity effects neither describes nor suggests a mask that includes an adjacent pair of patterning elements having one or more distorted dimensions to accommodate for diffraction effects, as recited in claim 20.

In this regard, Shi describes two different approaches to eliminating forbidden pitch regions. In the first approach, designers can select illumination angles that avoid the extreme interaction pitch areas which result in destructive interference. Such a selection of illumination angles leaves an optical lithography reticle unchanged. In Shi's second approach, "typically non-resolvable" scattering bars are placed around main features. Such a placement of scattering bars also

fails to describe or suggest a mask that includes an adjacent pair of patterning elements having one or more distorted dimensions to accommodate for diffraction effects, as recited in claim 20.

Accordingly, claim 20 is not obvious over Hada and Shi. Applicant respectfully requests that the rejections of claim 20 and the claims dependent therefrom be withdrawn.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Applicant asks that all claims be allowed. No fees are believed due at this time. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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